

UROPODID MITES PHORETIC ON FLEAS OF GROUND SQUIRRELS IN CALIFORNIA

TOM G. SCHWAN AND DAN CORWIN

Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Allergy and Infectious Diseases, Laboratory of Pathobiology, Rocky Mountain Laboratories, Hamilton, Montana 59840.

Abstract.—Uropodid mites were found attached to two species of fleas, *Diamanus montanus* and *Opisocrostitis oregonensis*, associated with ground squirrels in California. This is the first record of such mites attached to fleas in the New World.

The phoretic attachment of deutonymphs of uropodid mites to insects is well known (Krantz, 1978). However, observations of such associations involving fleas as phoronts are uncommon. Previous records of fleas as phoretic hosts of uropodid mites are restricted to Poland (Oudemans, 1913), Russia (Ioff, 1926; Zasukhin et al., 1936; Popov, 1957), China (Zasukhin et al., 1936), and Sweden (Brinck-Lindroth and Smit, 1971). From September 1980 to June 1983, approximately 15,000 fleas were examined for phoretic mites during surveillance activities for plague in California. Herein we document the association of uropodid mites with two species of ground squirrel fleas, the first such records of this relationship involving fleas in the New World.

METHODS AND MATERIALS

Fleas were collected in saline by staff of the Vector Biology and Control Branch, California Department of Health Services, and county health departments. Fleas were identified and those with mites attached were preserved in 70% ethanol. For scanning electron microscopy (SEM), fleas were attached to a stub with double stick tape, critical point dried, coated with a 15 nm layer of a gold-palladium alloy, and viewed with a J.E.O.L. 35-CF scanning microscope.

RESULTS

Of the approximately 15,000 fleas examined, only 2 specimens of *Diamanus montanus* (Baker) and 6 of *Opisocrostitis oregonensis* (Good and Prince) had uropodid mites attached. Records are: 23 February 1981, 1 mite ex *D. montanus* ♀ ex *Spermophilus beecheyi*, Santa Barbara Co., CA; 7 May 1982, 1 mite ex *D. montanus* ♀ ex *S. beecheyi*, Los Angeles Co., CA; 20 April 1982, 5 mites ex 2 *O. oregonensis* ♀ ex 2 *S. beldingi*, Modoc Co., CA; 13 May 1982, 6 mites ex 4 *O. oregonensis* (2 ♂, 2 ♀) ex *S. beldingi*, Modoc Co., CA. Six fleas had only 1 mite attached while 2 fleas had 3 and 4 mites attached.

Phoresy provides the means for many mites, which have only limited movement of their own, to disperse greater distances by attaching in various ways to insect hosts (Binns, 1982). Uropodid deutonymphs attach by means of an anal pedicel (Figs. 1, 2) formed by a glandular secretion that hardens on contact with the air. The broad base of a pedicel is shown in Fig. 3. Numerous examples of fleas as phoretic hosts for acaridid hypopodes are known (e.g. Fain and Baker, 1983; Fain and Schwan, 1976, 1984). However, such associations between uropodid mites and fleas are rare. When



Figs. 1, 2. Uropodid deutonymphs attached to the abdomen of a female *Opisocrotis oregonensis*. Bar equals 100 μ m.



Fig. 3. Basal attachment of caudal stalk to the flea's cuticle. Bar equals 10 μ m.

they occur, the mites probably represent a very small proportion of the total population, the majority of which are dispersing from rodent burrows on beetles and flies.

ACKNOWLEDGMENTS

We thank B. Nelson, R. Doty, E. Lusk, C. Smith, K. Townzen, J. Clover, M. Madon, R. Yescott, C. Meyers, and T. Smith, Vector Biology and Control Branch, California Department of Health Services, for their help in collecting fleas throughout California. C. Welbourn, Acarology Laboratory, Ohio State University, Columbus, provided some of the literature. We also thank Betty Kester and Gary Hettrick for their assistance in preparing the manuscript.

LITERATURE CITED

- Binns, E. S. 1982. Phoresy as migration—some functional aspects of phoresy in mites. *Biol. Rev.* 57: 57–620.
- Brinck-Lindroth, G. and F. G. A. M. Smit. 1971. The Kemner collection of Siphonaptera in the Entomological Museum, Lund, with a check-list of the fleas of Sweden. *Entomol. Scand.* 2: 269–286.
- Fain, A. and G. T. Baker. 1983. *Trichopsyllus oregonensis* g.n., sp.n. (Acari, Acaridae), a new hypopus phoretic on a flea *Trichopsyllodes oregonensis*, parasitic on the rodent *Aplodontia rufa* in the United States. *Can. J. Zool.* 61: 928–929.
- Fain, A. and T. G. Schwan. 1976. *Paraceroglyphus xenopsylla* sp.n., a new hypopus phoretic on *Xenopsylla cheopis* in Kenya. *Rev. Zool. Afr.* 90: 634–639.
- . 1984. Three new hypopial nymphs (Acari: Acaridae) phoretic on fleas parasitic on rodents in California, USA. *Bull. Ann. Soc. R. Belge Entomol.* 120: 91–97.

- Ioff, I. G. 1926. Arbeiten zum Studium der Ekto-
parasitenfauna in sud-ostlichen Steppen U.S.S.R.
Trudy 5 protivochn. Konfer. Saratov. 200-204
(in Russian).
- Krantz, G. W. 1978. A Manual of Acarology. Oregon
State University Book Stores, Inc., Corvallis. 509
pp.
- Oudemans, A. C. 1913. Acarologische Aanteeken-
ingen XLVII. Entomol. Ber. Amst. No. 71: 372-
376.
- Popov, P. P. 1957. On ectoparasites of soft Ornithod-
oros ticks. Dokl. Akad. Nauk Azerb. S.S.R. 13:
701-703 (in Russian).
- Zasukhin, D. N., I. G. Ioff, and V. E. Tiflov. 1936.
Materials for the study of the parasites and ene-
mies of fleas. Vestn. Mikrobiol. Epidem. Parazit.
15: 27-44 (in Russian).